Models as Make-believe: Imagination, Fiction and Scientific Representation

Corry, Olaf

Published in:
British Journal of Aesthetics

Publication date:
2015

The British Journal of Aesthetics Advance Access published August 5, 2014

BOOK REVIEW

Models as Make-Believe: Imagination, Fiction and Scientific Representation

ADAM TOON

PALGRAVE. 2012.

What do the following social practices have in common: children playing with dolls houses or Lego bricks and scientists building and using models to examine how the world works? More than one might think, according to a fascinating new book by Adam Toon. Scientists spend a lot of time building, using and revising models of different parts of the world, from subatomic particles to the solar system, world history or the international system (if you count social scientists such as this reviewer). So what models are, and how they represent the world, is in many ways an important question. Adam Toon in *Models as Make-Believe* offers a lucid and stimulating argument that deserves to be read widely, inside as well as outside philosophy. Although he concentrates on models in the natural sciences, his argument potentially pertains to knowledge production aimed at global challenges such as climate change and managing the world economy, where modelling is central. The following presents this reviewers' understanding of the key argument and suggests some implications for how we should view and treat models.

How do scientific models represent the world? The book critiques the 'indirect view' according to which models first construct a fictional 'model-system' where idealized or simplified conditions exist (planets as perfect spheres, friction free movement, perfectly rational states, etc.). In a second iteration scientists compare such model-systems to the parts of reality that they supposedly depict or otherwise represent.

Toon argues that this indirect view of the work that models do has a number of problems. One is that it is unclear what status these model-systems have. How come we can know things about models, discuss them and think about them, even say true or false things about them, without them really existing? To a realist, making meaningful statements about something requires there to be a 'something' and so the entities that statements in a model refer to must exist in some sense, e.g. like fictional characters in novels. The question then remains, however, what such fictional entities are. Anti-realists avoid this problem, because they argue that fictional-realists do not need to exist in any sense outside the statement about them. But this makes it difficult to claim that the model-system (which does not exist) matches or otherwise resembles another object and opposite statements about them would potentially be equally valid (saying the fictional character 'Dracula is a vampire' would be equally as true as 'Dracula is a vegetarian'). So either way the indirect view relies on something it cannot account for.

A second problem of the indirect view relates to the second stage where the model-system is said to represent an object. Sometimes models 'represent' things that do not exist. This could be models of things that turn out not to exist such as the ether, but also more mundanely applies to a model of a bridge that never gets built, or an experiment that ends up not having funding and so never sees the light of day. In fact, models routinely and deliberately involve misrepresentation. In such cases, what does a model then represent? And if it doesn't represent anything, how can it then still be a model (if models by definition represent things)? Toon argues that models still represent, even when the object is missing. Modelling as a practice is not dependent upon there being a target, but the indirect view of models seems to require this.

The 'models as make-believe' view, Toon argues, can help us with both problems. It suggests that models are 'props' that make an audience imagine things directly about the world: 'They prescribe a web of

British Journal of Aesthetics

imaginings which the scientist can then go on to explore' (75). In doing this, we are asked to reject the idea that models are 'fictions' simply because they are inaccurate or claimed not to be true. Rather, Toon adapts Kendall Walton's theory of art and its rather specific idea of fiction. For Walton, fictionality depends on something being used as a prop in a game of make-believe. Props plus 'principles of generation' prescribe us to imagine things about the world. This view of 'fiction' makes sense because it is not synonymous with truth or falsehood. Books we find on the 'non-fiction' shelf may be credible or non-credible and we choose whether to believe them or not, but in both cases they are non-fiction. In contrast, the special thing about 'fiction' in Walton's sense is that the reader is *required* to imagine the things that a novel, a picture—or a model—asks us to imagine. The reader of a fictional novel, or a child doing role play, plays a game of make-believe. Similarly, 'scientists using the model understand that they are to imagine everything that the model says, simply because it says it' (75).

This direct view supposedly removes the problem of what the 'model-system' is because it does away with the intermediary model-system altogether. Instead models prompt us to have imaginings about the world directly. It also avoids the problem of how models can be models despite 'missing objects'. A model may represent something that does not really exist, because models are fictional only in the sense that we enter into a game of make-believe that requires of us that we imagine what they describe. Equally something could also be fictional (in this Waltonian sense) even while what it represents is true, just as the novel 'War and Peace' prescribes that we imagine Napoleon invading Russia in 1812 (which he did) (40). What makes it fictional is that it prescribes imaginings about the world that we are to go along with. Scientific models work in the same way, Toon suggests.

Apart from tackling these philosophical problems, Toon argues persuasively that this direct view is in many ways a more accurate way of accounting for what actually goes on when scientists construct and use models. Chapter 5, 'Playing with Molecules', presents a thought-provoking analysis of social interaction between a scientist and some non-scientists who were filmed while being asked to 'reason out loud' as they made sense of a physical model of a molecule. Toon claims to show the participants talk as if they are discussing the molecule itself (rather than a model of it), and 'speak as if they can *see* the molecule' (113), handling it *as if* they were manipulating the molecule itself.

To this social scientist the postulated similarities between make-believe games and the use of scientific models seem quite convincing. In international relations, game theorists set up models, e.g. with two perfectly rational states playing 'chicken' or in prisoners' dilemmas and speak about make-believe countries: 'Country *A* defects' or 'Country *B* cooperates.' They draw pictures of the structure of anarchy in the international system and even say a theory is a 'picture, mentally formed, of a bounded realm or domain of activity. A theory is a depiction of the organization of a domain and the connections among its parts'.[1] Social scientific models are usually prepared descriptions, images or computer-generated models rather than physical objects. But as long as they function as props for imaginings, they will all be models, according to this account.

'So what?', the reader may ask. The implications of the make-believe view might have been spelled out more clearly, although to be fair, this takes us beyond the remit of the book. Still, some implications are hinted at (and others I infer).

Firstly, if a model is a prop to imagine things about the world, this changes the status of imagination in scientific work. Imagination, in this case, is not a frivolous human weakness but an indispensable scientific tool. Rationalist modelling is therefore perhaps less rationalistic than its proponents have claimed. Citing the historian Alan Rocke, Toon argues that early 'chemists' ability to imagine the unseen microworld of atoms was a "pillar" of their methodology' (107). International relations scholars' ability to imagine the unobservable world of structure in the international system would also be an indispensable tool for learning about the world. Rather than just being a

1 Kenneth Waltz, *Theory of International Politics* (New York: McGraw-Hill, 1979), 8.

simplifying device, models are generative. We arguably commit ourselves much more wholeheartedly to models than if they were similar to fictional characters, and therefore perhaps we ought to be more wary of the powers we allow them to have over us.

Secondly, Toon's account appears to imply that the practice of scientific modelling should not be understood as an individualistic form of practice. According to Walton's theory of art, fiction is 'public' in the sense that it does not depend on what is imagined subjectively, but on what the generative rules prescribe we should imagine. Toon takes the example of children playing a game where tree stumps in a forest 'are' bears. He points out that even if one of the children thinks that one stump actually resembles a wolf, the game still makes it fictional that it is a bear. This might suggest that modelling is a special case of a more general kind of practice in which meanings and rules for interpretation and action are created and negotiated socially. Can modelling be considered a kind of performative 'speech act'? Toon notes that the water running through a Phillips model (representing the inflows and outflows of a generic national economy) is different from the water running through the pipes in his flat, even though neither represents a particular instance of something (e.g. a specific national economy). The difference is that in the Phillips model a game of make-believe is being enacted even while there is no specific object being represented. This also implies that modelling, like speech acts, requires validation from an audience—something the book does not spell out (or refute). If the individual child is reminded of a wolf when it sees a tree stump, this is not an act of representation, unless she suggests it as a new rule *and* the other children accept it as now being a wolf. How scientific models actually function therefore depends on an audience 'playing the game' and scientific modelling must therefore be seen as a thoroughly social activity.

Finally, what models are made of (physical objects, pictures, concepts, etc.) appears to make a difference to how they work. Simple stipulation that a model should be taken to represent something is not enough. To 'model-represent', Toon argues, requires some form of depiction in the sense that models have to help us imagine what it is they represent. How they model-represent something matters. As Toon explains, in the game of bears in the woods, the props (the tree stumps) themselves represent something (bears) and the children imagine they are looking at bears. The tree stumps perform a 'reflexive' model function. In contrast, in the novel *War and Peace* the ink on the page is not imagined to be Napoleon or Russia, even though the words are props that facilitate imaginings about Napoleon and Russia. To view a picture of Napoleon, on the other hand, involves the observer also imagining he or she is actually looking at Napoleon. For the models as make-believe approach, pictures and models therefore matter in themselves. Diagrams and objects *are* the model, not a representation of the model.

Despite this, and the delightfully clear argumentation throughout, a couple of questions internal to the argument of the book remained unclear to this reviewer. We are told that the status of fictional model-systems is problematic in the indirect view, but there is apparently no problem accounting for the status of the 'imaginings' that the make-believe view points to. Is this perhaps because in the direct view we can get away with an anti-realist position that says they do not need to exist, since nothing is subsequently compared to reality (we imagine reality directly)? Yet Toon seems to suggest that imaginings about the world *are* ultimately to be compared to target systems: 'Simply put, a model is accurate in a certain respect if and only if what it prescribes us to imagine in that respect is *true* of the object it represents' (67). This raises the question of whether Toon's may also be an indirect view of sorts. It could of course be argued that evaluating models is not part of the modelling process. But the aim throughout the book is to understand how models are actually used to produce and evaluate knowledge. Is the direct view then in fact also an incomplete view of scientific modelling?

Olaf Corry
Department of Politics & International Studies
The Open University
Olaf.Corry@open.ac.uk
doi:10.1093/aesthj/ayu017